

# 6.1 Polygons

- Goals**
- Identify, name, and describe polygons.
  - Use the sum of the measures of the interior angles of a quadrilateral.

## VOCABULARY

Polygon

Sides

Vertex

Convex

Nonconvex

Concave

Equilateral

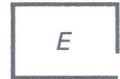
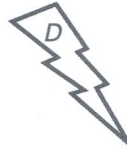
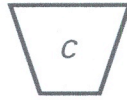
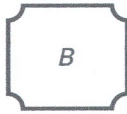
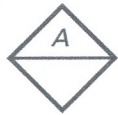
Equiangular

Regular

Diagonal

**Example 1** *Identifying Polygons*

State whether the figure is a polygon. If it is not, explain why.

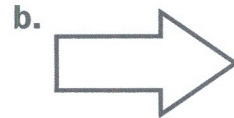
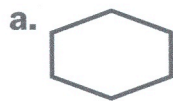
**Solution**

Figures \_\_\_ and \_\_\_ are polygons.

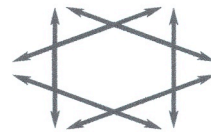
- Figure \_\_\_ is not a polygon because \_\_\_\_\_.
- Figure \_\_\_ is not a polygon because \_\_\_\_\_.
- Figure \_\_\_ is not a polygon because \_\_\_\_\_.

**Example 2** *Identifying Convex and Concave Polygons*

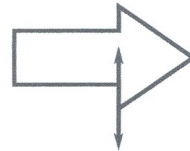
Identify the polygon and state whether it is convex or concave.

**Solution**

- a. The polygon has \_\_\_ sides, so it is a \_\_\_\_\_. When extended, none of the sides intersect the interior, so the polygon is \_\_\_\_\_.

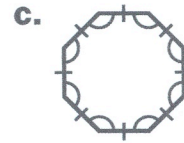
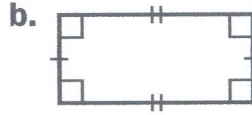
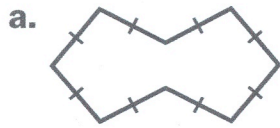


- b. The polygon has \_\_\_ sides, so it is a \_\_\_\_\_. When extended, some of the sides intersect the interior, so the polygon is \_\_\_\_\_.



Decide whether the polygon is regular.

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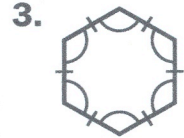
### Solution

a. The polygon is \_\_\_\_\_, but it is not \_\_\_\_\_. So, it \_\_\_\_\_ regular.

b. The polygon is \_\_\_\_\_, but it is not \_\_\_\_\_. So, it \_\_\_\_\_ regular.

c. The polygon is \_\_\_\_\_ and \_\_\_\_\_. So, it \_\_\_\_\_ regular.

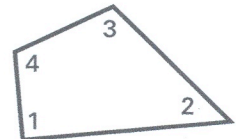
✓ **Checkpoint** Name the polygon. Is the polygon convex or concave? Is it regular?



### THEOREM 6.1: INTERIOR ANGLES OF A QUADRILATERAL

The sum of the measures of the interior angles of a quadrilateral is \_\_\_\_\_°.

$$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = \text{_____}^\circ$$



**Example 4****Interior Angles of a Quadrilateral**Find  $m\angle U$  and  $m\angle V$ .**Solution**

Find the value of  $x$ . Use the sum of the measures of the interior angles to write an equation involving  $x$ . Then, solve the equation.

$$5x^\circ + (3x + 10)^\circ + 72^\circ + 118^\circ = \underline{\hspace{1cm}}^\circ$$

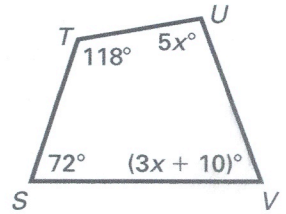
$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$x = \underline{\hspace{1cm}}$$

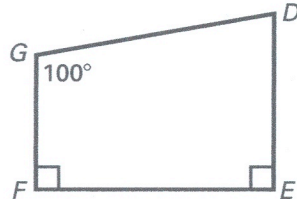
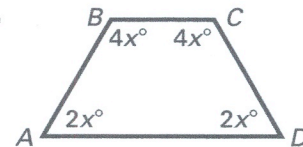
Use Theorem 6.1.

Combine like terms.

Subtract  $\underline{\hspace{1cm}}$  from each side.Divide each side by  $\underline{\hspace{1cm}}$ .Find  $m\angle U$  and  $m\angle V$ .

$$m\angle U = 5x^\circ = (5 \cdot \underline{\hspace{1cm}})^\circ = \underline{\hspace{1cm}}^\circ$$

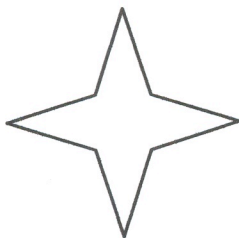
$$m\angle V = (3x + 10)^\circ = (3 \cdot \underline{\hspace{1cm}} + 10)^\circ = \underline{\hspace{1cm}}^\circ$$

Answer So,  $m\angle U = \underline{\hspace{1cm}}^\circ$  and  $m\angle V = \underline{\hspace{1cm}}^\circ$ .**✓ Checkpoint Find  $m\angle D$ .****4.****5.**

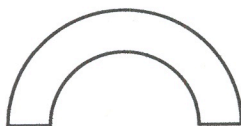


Decide whether the figure is a polygon. If not, explain why.

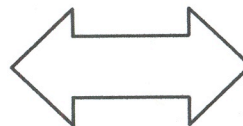
1.



2.

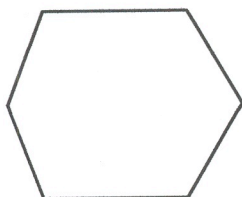


3.

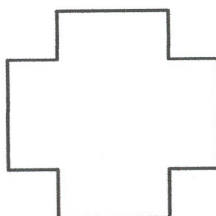


Use the number of sides to tell what kind of polygon the shape is. Then state whether the polygon is *convex* or *concave*.

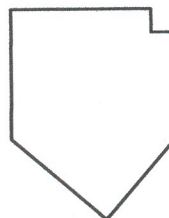
4.



5.

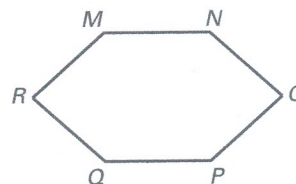


6.



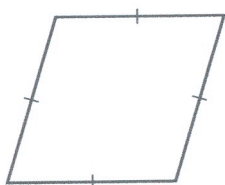
Use the diagram at the right to answer the following.

7. Name the polygon by the number of sides it has.
8. Polygon  $MNOPQR$  is one name for the polygon. State two other names.
9. Name all of the diagonals that have vertex  $M$  as an endpoint.
10. Name the consecutive angles to  $\angle N$ .

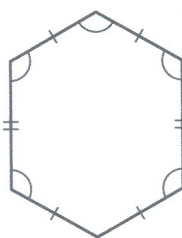


State whether the polygon is best described as *equilateral*, *equiangular*, *regular*, or *none of these*.

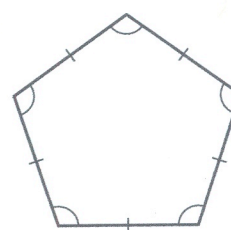
11.



12.

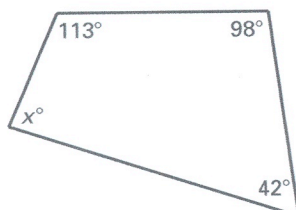


13.

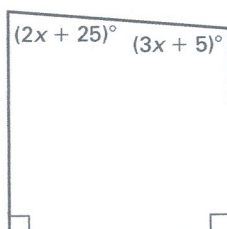


Use the information in the diagram to solve for  $x$ .

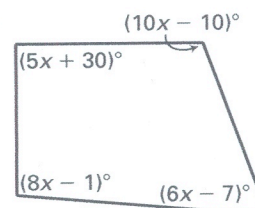
14.



15.



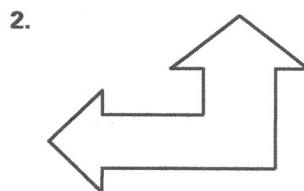
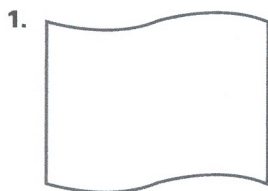
16.



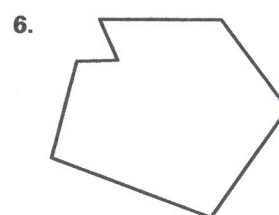
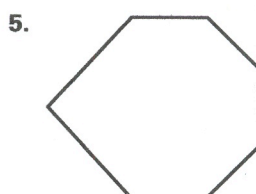
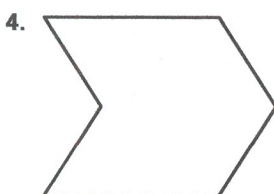
# Practice B

For use with pages 322–328

Decide whether the figure is a polygon. If not, explain why.

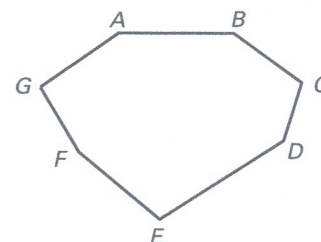


Use the number of sides to tell what kind of polygon the shape is. Then state whether the polygon is *convex* or *concave*.



Use the diagram at the right to answer the following.

7. Name the polygon by the number of sides it has.
8. Polygon  $ABCDEFG$  is one name for the polygon. State two other names.
9. Name all of the diagonals that have vertex  $E$  as an endpoint.
10. Name the nonconsecutive angles to  $\angle A$ .



Draw a figure that fits the description.

11. A convex octagon
12. A concave decagon
13. An equilateral quadrilateral that is not equiangular
14. An equiangular quadrilateral that is not equilateral
15. An equiangular hexagon that is not regular

Use the information in the diagram to solve for  $x$ .

